

the character of producing a single sporidium as peculiar to *Coleosporium*, but he names the entire tube from which this body is abscised a sterigma. Since the term sterigma is more or less broad, we may regard *Coleosporium* as possessing a truly non-septate promycelium, and still the above details will perhaps make clear the essential modifications in *R. cassiæcola* and probably the general features in the germination of the genus *Ravenelia*.

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EXPLANATION OF PLATES IX AND X.

PLATE IX.—Fig. 1, germinating teleutospore, showing normal condition of promycelium. Fig. 2, same as above with a slight geniculation and rudimentary branching. Fig. 3, a promycelial branch almost at right angles to the former course. Fig. 4, *a* and *b*, stages in the development of sporidia; *a* also shows apparent septa. Fig. 5, *a* and *b*, sporidia; *c*, sporidium germinating. Fig. 6, *a* and *b*, abnormal conditions of promycelia. Fig. 7, *a* and *b*, same as fig. 6, but representing appearances on following day. Fig. 8, teleutospore with single promycelium and abscised sporidium germinating while still in the vicinity of its point of production.

PLATE X.—Fig. 9, *a* and *b*, peculiar development of a promycelium noted on successive days. Figs. 10, 11 and 12, representing cells separated by pressure, and showing the location of the germ pores and the emergence of the promycelia. Fig. 13, teleutospore germinating, but so surrounded by other spores that the promycelia are modified. Figs. 14 and 15, normal teleutospores of different number of cells. Figs. 16, *a*, *b* and *c*, individual cells, showing relative thickness of cell walls and the common external coat.

All figures were drawn under camera lucida.

Notes on *Carex*. XVI.

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An unusual amount of *Carex* material has come into my hands within the last year, bringing a number of new species, extending the ranges of well known species to an important extent, and affording data for the clearing up of old doubts. These specimens have come from almost every part of North America and from very many collectors; in fact, the *Carex* flora of the country has never had so many friends as at present. Some of the most important facts concerning the geographical distribution of species are recorded below.

Carex obesa All., var. *minor* Boott, heretofore not known south of Saskatchewan, was collected last July upon high bluffs at South Fowl Lake, Northern Minnesota, by F. F. Wood.

C. Torreyi, the rarest of the eastern carices, was found in abundance upon a small area in 1890, in the suburbs of Minneapolis, by J. H. Sandberg. This species was reported from New York and Pennsylvania a half century ago, but has never been rediscovered within Gray's Manual region until the present finding. It occurs in Colorado and in British America, and its reference to New York and Pennsylvania is probably an error. The original specimens were found in a European herbarium mixed with *C. pallescens* from New York and Carlton House, British America.

C. Tuckermanni, reported no farther east than western New England, has been found at Kineo, Moosehead Lake, Maine, by Dr. G. G. Kennedy.

C. chordorhiza, not known east of Vermont heretofore, is sent from Orono, Maine, by M. L. Fernald.

C. laxiflora var. *divaricata* has been collected at Natural Bridge, Virginia, by J. R. Churchill.

C. hystericina var. *Dudleyi* was found growing quite abundantly in a low place at Owosso, Michigan, by G. H. Hicks. This is the fourth station for the plant.

C. cephaloidea, not known east of western Massachusetts, where Dewey first found it, is now found in York Co., New Brunswick, by Mr. Brittain.

C. trichocarpa var. *Deweyi*, is sent from Ames, Iowa, by Professor A. S. Hitchcock. It has been known in the Manual region only from Dakota.

C. distans Linn., a European species, was found in ballast in Philadelphia, in 1877 and 1884, by I. C. Martindale. Mr. Martindale also found at Atco, N. J., in 1876, the true *C. flava* var. *Æderi* Lilj. This is the only finding of this plant in America, so far as I know. *C. panicea* is sent from Sellersville, Penn., by C. D. Fretz. This species, while very thoroughly established in some parts of Massachusetts, does not appear to extend itself rapidly into new regions.

Since the separation and proper delineation of *C. deflexa* and *C. Novæ-Angliæ*, these species have been sought and they are found to be more frequent than the Manual record indicates. *C. deflexa* is not confined to "high mountains," having even been found in a low sandy pasture on the banks of Great Works River, S. Maine, by John C. Parlin. It is also sent from the Keweenaw peninsula, Northern Michigan, by O. A. Farwell. *C. Novæ-Angliæ* is frequent at Mt. Desert, and

Edwin Faxon sends a fine suite of specimens from the White Mountains: from Profile Lake and Bald Mt., Franconia Notch; White Mt. Notch near Willey House; woodland cleared of trees, between Fabyan's and base of Mt. Washington; summit of Mt. Willard. It is strange that this well marked species should have been so long overlooked.

Three species are added to the Manual region from Nebraska: *C. Nebraskensis* Dewey, from Anselmo, Custer Co., and Hot Creek Basin, Sioux Co., by H. J. Webber. This is the first time the species has been found within the present limits of Nebraska. *C. Douglasii* Boott, Anselmo, Custer Co., Webber. *C. marcida* Boott, Anselmo and Broken Bow, Custer Co., and Thedford, Thomas Co., Webber; Alliance, Box Butte Co., G. D. Swezey.

C. canescens var. *dubia* Bailey, which has been one of the most obscure forms of a perplexing species and which has been known only from one collection in the Uintah Mountains and another in the Wahsatch, is now represented in my herbarium by good specimens from the Blue Mts. of Eastern Oregon (Cusick), Skamania Co., Washington (Suksdorf), and Tulare Co., Cal. (Coville, 1506 Death Valley Expedition). It proves to be well defined.

Among the novelties, the following appear to be supported by sufficient evidence:

C. herbariorum n. sp.—One of the FERRUGINEÆ allied to *C. ablata* and *C. luzulaefolia*: tall and slender (2 ft. or more?), smooth throughout; leaves broad ($\frac{1}{4}$ or $\frac{3}{8}$ in.), thick and stiff and apparently half evergreen, long; staminate spike single, an inch or two long, on a stalk of about its own length, rusty, the scales nearly linear and pointed; pistillate spikes 3 or 4, approximated near the top of the culm, erect, an inch or so long, evenly cylindrical, rather loosely flowered, rusty, on stalks once or twice their own length and springing from loose sheaths about an inch long which are tipped with an awn-like projection of similar length; perigynium medium or below in size, lanceolate, prominently excurved at maturity, strongly nerved and 2-toothed, smooth, about the length of the ovate and pointed brown-margined scale.—A well marked species with perigynia reminding one of the interesting VIGNEASTRÆ section. Habitat unknown. The species was found in a miscellaneous batch of nondescript carices from Herb. Olney (Brown University), without date, locality or

collector. Since the determination of the species, James L. Bennett, of Brown University, writes that the plant was collected by Wheeler's Expedition West of the 100th Meridian. In Wm. Boott's report upon the carices of this expedition there is nothing to suggest this species.

C. Pringlei n. sp.—One of the PALUDOSÆ, not closely allied to any American species, but coming nearest, perhaps, to *C. riparia*: tall, stiff and stout (four to six feet high), pale throughout, the culm obtusely angled and smooth; leaves stiff and long, rough on the edges and sometimes on the keel; staminate spikes three or four, an inch or two long or the terminal one twice longer, cylindrical, scarcely stalked, the bases enveloped by a scarious bract, the scales of the spikes linear and membranaceous with a somewhat expanded tip which is more or less jagged and provided with a short cusp; pistillate spikes three to six, all approximated or aggregated, heavy and densely flowered, two to four inches long, sessile and erect, their bases subtended by an expanded and long-pointed bract; perigynium long-linear-elliptic or linear-ovate (about four lines long), thin and flat, the small and stipitate three-angled achenium lying nearly in the center, faintly few nerved, beakless, the orifice entire or slightly sulcate, the lower portion smooth, but the upper part sparsely hairy, about the length of or slightly shorter than the strong-pointed or even awned rough scale.—A coarse bushy-spiked species with something the look of *C. spissa*; collected August 4, 1891, on borders of pools and streams in alkaline meadows one hundred miles east of the city of San Luis Potosi (Hacienda de Angustura), Mexico, by C. G. Pringle (No. 3801).

C. xerantica n. sp.—Group OVALES, between *C. pratensis* and *C. fœnea*: differs from the above species in its short erect silvery-white head, and broader, much firmer and nerveless perigynium. It is a tall and very stiff species with a straminea-like aspect, and dry appearance. It was collected at File Hills, British America (104° longitude, and $50\frac{1}{2}^{\circ}$ latitude), by John Macoun, July 4, 1879, and at Moose Jaw, about thirty miles west and forty south of File Hills, by the same collector July 18, 1880, in both of which stations it was rather abundant. I have endeavored for a number of years to refer this perplexing plant to some of its neighboring species, but the attempt is always unsatisfactory. Its characters are constant in a good suite of specimens, and it appears to merit specific distinction.

C. Montanensis n. sp.—Belongs to the RIGIDÆ and is allied to *C. Tolmiei*, although it has much the habit of the PENDULINÆ (as *C. Magellanica*): a foot or a foot and a half high, in tough clumps, the culms weak at the top and mostly nodding, somewhat overtopping the flat and rather soft narrow ($1\frac{1}{2}$ to 3 lines wide) leaves; staminate spike single, about a half inch or less long, ovate or ovate elliptic, brown-purple, on a short and weak stalk, the scales thin and mostly blunt; pistillate spikes three to five, borne at the top of the culm and drooping or nodding on slender stalks, from one-half to three-fourths of an inch long, dark colored, the lowest bract leafy and about equalling the culm; perigynium ovate, soft, nerveless (entirely lacking in the granulated character of *C. Magellanica* and its allies), terminated by a short and very slightly toothed beak about the length of but broader than the black-purple blunt scale; stigmas two or three.—Montana, Upper Marais Pass, W. M. Canby, Aug. 2, 1883 (no. 350), and along subalpine streams, Park County, Frank Tweedy, Aug. 5, 1887. Also on mountain slopes, Kootanie Pass, Rocky Mountains of British America, John Macoun, Aug. 9, 1883. I have at different times referred this plant to *C. atrata* var. *ovata* and *C. Tolmiei*.

C. bella n. sp. (*C. atrata* var. *discolor* Bailey).—This beautiful plant appears to have no immediate connection with *C. atrata*, and when I first referred it to a variety of that species I thought that "it is not improbable that it is specifically distinct from *C. atrata*" (Journ. Bot., Nov. 1888). It is more closely allied to *C. Mertensii*. It is a slender plant, about two feet high, the culms surpassing the flat and long pointed leaves; spikes 3 or 4, the terminal one prominently staminate below and the others usually bearing more or less staminate flowers at the base, all approximated, the lowest one or two drooping on very slender peduncles and the upper ones sessile or nearly so, all narrowly cylindrical (about 1 in. long), compactly flowered, the whitish perigynia contrasting forcibly with the purple scales; perigynium ovate, whitish, thin and somewhat inflated, nerveless, abruptly contracted into a very small straight beak which is very lightly toothed or simply erose, much broader and mostly a little longer than the purple sharp pointed scale.—Mountains, Colorado, Utah, and Arizona.

C. varia Muhl. var. **australis** n. var.—Stoloniferous; spikes all distinct or at least not aggregated, the lowest one often entirely separated from the rest, all usually longer than in the species itself; staminate spike straight and conspicuous. Tupelo and Starkville, Mississippi, Tracy; Houston, Texas, Nealley; and Hockley, Harris Co., Texas, Thurow.

C. aquatilis × *stricta*. A pronounced hybrid between these species has been found in some quantity at Orono, Maine, by M. L. Fernald. The hybrid is fully as vigorous as *C. aquatilis*, and is glaucous, but the perigynia and scales are *stricta*-like, although the spikes are large and thick, as in *C. aquatilis*.

Material wanted.—A carex which is said to produce good pasturage is reported to grow in Louisiana, but I have not been able to secure good specimens of it. I have obtained a bunch of the dry leaves and some loose perigynia from a correspondent in Grant Parish, central Louisiana, and I am not able to place the specimens with any species. It appears to be undescribed. My correspondent writes me as follows: "The plant grows here in the forest upon alluvial lands upon certain portions of the Red River bottoms. Near me are 500 or 600 acres covered with it upon which numbers of cattle and horses winter. It grows as thick as any grass, and not in bunches here and there, making a perfectly green and firm covering four to eight inches high." Unfortunately, my correspondent is not a botanist, and an expert witness is wanted to determine if all this pasturage is really a carex; and I desire good specimens of the plant for determination.

Our common *Carex echinata*, with its varieties, is in need of revision, and I shall be glad of any specimens which will throw light upon its variations.

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